Adaptation to ultraviolet radiation: a case study of *Borghiella dodgei* - a psycrophilic dinoflagellate

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Little is known about the UV photobiology of psychrophilic dinoflagellates, particularly in freshwater systems. We addressed the adaptive strategies of *Borghiella dodgei* Moestrup, Gert. Hansen et Daugbjerg to cope with environmental stressors, in particular ambient levels of ultraviolet radiation (UVR) under cold conditions. Several physiological parameters related to growth, metabolism, and UVR protection were determined in UVR-exposed and control cells through stable isotope analysis, spectrophotometry, and liquid chromatography– mass spectrometry (LC / MS). In UVR-exposed cells, assimilation of ^{15}N and ^{13}C and content of chl *a* and carotenoids, specifically diatoxanthin with respect to dinoxanthin and diadinoxanthin, were increased; furthermore, catalase activity showed a cyclic pattern with a strong increase after UVR exposure but a rapid return to pre-exposure levels. Both in UVR-exposed and control cells, no lipid peroxidation of galactolipids was observed. However, in UVR-exposed cells, content of galactolipids was higher and linked to an increase in monogalactosyldiacylglycerols (MGDGs). *Borghiella*'s adaptation to UVR depended on a general metabolic enhancement and efficient scavenging of oxygen radicals to mitigate and counteract damage. While *Borghiella* seemed to be well adapted to ambient levels of UVR, the interactive effects of higher temperatures and UVR on psychrophilic species merit further investigation, especially in the light of possible climate change.